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National Standards Authority of Ireland

IRISH STANDARD

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National Standards
Authority of Ireland
Dublin 9
Ireland

Tel: (01) 807 3800
Tel: (01) 807 3838

UNPLASTICIZED PVC PIPE FOR COLD WATER SUPPLY

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Údarás um Chaighdeáin Náisiúnta na hÉireann

DECLARATION

OF

SPECIFICATION

ENTITLED

UNPLASTICIZED PVC PIPES FOR COLD WATER SUPPLY

AS

THE IRISH STANDARD SPECIFICATION FOR

UNPLASTICIZED PVC PIPES FOR COLD WATER SUPPLY

———

The Institute for Industrial Research and Standards in exercise of the power conferred by subsection (3) of section 20 of the Industrial Research and Standards Act, 1961 (No. 20 of 1961), and with the consent of the Minister for Industry and Commerce (signified by his Official Seal affixed hereto), hereby declares as follows:

1. This instrument may be cited as the Standard Specification (Unplasticized PVC Pipes For Cold Water Supply) Declaration 1964.

2. (1) The specification set forth in the Schedule to this declaration is hereby declared to be the standard specification for Unplasticized PVC Pipes For Cold Water Supply.

(2) The said standard specification may be cited as Irish Standard 123: 1964 or I.S. 123: 1964.

SCHEDULE

Unplasticized PVC Pipes for Cold Water Supply

SCOPE

1. This specification applies to pipes made from unplasticized polyvinyl chloride (Type 100) for use in cold water supply. The designation (Type 100) is an indication of the recommended maximum working stress for the material expressed as the force in kilograms weight per square centimetre (kgf/cm^2) at 20°C. when in pipe form. Distribution and service pipes of one class and watermain pipes of three classes are covered.

In order to distinguish between the kilogram as a unit of mass and the weight (under standard gravity) of a kilogram as a unit of force, the abbreviations "kg" for the kilogram as a unit of mass and "kgf" for the kilogram-force as a unit of force (980 665 dynes) are used in this specification.

CLASSIFICATION

2. Distribution and service pipes are covered by a single series of pipes which may be used for working pressures up to 400 feet head of water (12·2 kgf/cm^2) and are of external diameter from 16 mm up to 50 mm. Watermain pipes covered by this specification are of three classes, B, C and D, and are suitable for use at nominal working pressures as follows:

Class B—at 200 ft. head of water (6·1 kgf/cm^2),
Class C—at 300 ft. head of water (9·15 kgf/cm^2),
Class D—at 400 ft. head of water (12·2 kgf/cm^2).

Class B and Class C pipes are of external diameters from 63 mm up to 400 mm and Class D pipes are of external diameters from 63 mm up to 200 mm.

COMPOSITION

3. The material from which the pipe is produced shall consist only of polyvinyl chloride to which may be added not more than six per cent by weight of any combination of stabiliser and lubricant. In addition, up to three parts in a hundred parts of resin by weight of one or more suitable opacifiers (e.g., Carbon black, Titanium dioxide (rutile)) shall be added.

No rework material other than the manufacturer's own clean rework material resulting from the manufacture of pipes to this specification shall be used.

The material from which the pipe is produced, when extruded into tube form and tested according to the method given in Appendix A, shall be capable of withstanding the following circumferential stresses applied at 60°C, for at least the period stated below:

Stress 170 kgf/cm²—minimum time to burst 1 hour
Stress 100 kgf/cm²—minimum time to burst 1,000 hours.

NOMINAL SIZES AND THICKNESSES

4. The nominal outside diameters and the wall thicknesses of the pipes shall be as given in Tables 1 and 2 for the corresponding designations or nominal sizes in inches.

PERMISSIBLE DEVIATION OF DIAMETER AND THICKNESS

5. At no section along the pipe shall any single diameter lie outside the limits in Table 1 or 2 as appropriate.

At no section along the pipe shall the mean outside diameter lie outside the limits given in Table 1 or 2 as appropriate. The mean outside diameter shall be taken as the mean of two diameters measured perpendicular to each other.

At no point along the pipe shall the wall thickness lie outside the limits given in Table 1 or 2 as appropriate.

LENGTH AND PERMISSIBLE VARIATION IN LENGTH

6. Pipes shall be provided in straight lengths. A positive tolerance only of 3 in. shall be allowed on the lengths of all pipes.

The length of distribution and service pipes shall be 15 feet over-all. The length of watermains shall be 20 feet exclusive of any socket. Not less than 95 per cent of any order shall be supplied in such lengths; the remainder may be supplied in 12 or 16 foot lengths.

Pipes may be provided in lengths other than the above if required by the purchaser.

APPEARANCE AND FREEDOM FROM DEFECTS

7. The pipes shall be reasonably smooth and clean both inside and outside. The surfaces shall be reasonably free from grooves, scratches, dents and other defects. The pipe shall not be kinked, but a slight uniform curvature is permissible. The pipe ends shall be cut off smoothly and square to the pipe axis. The material of the pipe shall not have any blisters, hollows or bubbles.

HYDRAULIC TESTS

8. (a) *Proof test*. Every pipe shall be capable of withstanding without signs of weeping or leakage a hydraulic pressure equal to twice the nominal working pressure (referred to in Clause 2) applied for a period of not less than 60 minutes at a temperature of 20°C.

(b) *Short term test*. The pipes shall comply with the test described in Appendix B using the appropriate test pressure given in the following table:

Type of pipe	Distribution and Service pipes of external diameters		Watermains all sizes		
	up to and including 25 mm	above 25 mm	Class B	Class C	Class D
Test pressure kgf/cm²	68	52	26	39	52

IMPACT TEST

9. When subjected to the falling weight impact test described in Appendix C not more than 5 per cent of the sample pieces shall fail.

SWELLING AND SHRINKAGE

10. When tested in accordance with Appendix D the pipes shall not change their axial and radial dimensions by more than 5 per cent and 2·5 per cent respectively. Bubbles and scales shall not occur in the test pieces.

EFFECT ON WATER

11. The pipes shall not impart to water any odour, taste or colour or any toxic matter in concentrations which might be injurious to health. When tested by the method described in Appendix E, the quantity of lead extracted from the internal walls of the pipes shall not exceed 15 mg/m² on the first extraction and shall be less than 4·5 mg/m² on the third extraction; the quantity of barium, cadmium, tin, zinc and other constituents generally considered to be toxic when taken together shall not exceed 0·5 mg/m² on the first extraction and shall be less than 0·15 mg/m² on the third extraction. The total of all toxic constituents detected on the third extraction shall be less than 4·65 mg/m².

When required by the purchaser, the manufacturer shall disclose the toxic constituents present.

LIGHT TRANSMITTANCE

12. The walls of pipes for use overground, when tested in accordance with Appendix F, shall not have a light transmittance of more than 0·2.

ACETONE TEST

13. Test pieces of the pipe, when subjected to the test described in Appendix G, shall show no sign of powdering or flaking.

MARKING

14. Every pipe shall be indelibly and legibly marked with the following:
(a) the manufacturer's name or mark,
(b) the words "I.S. 123 : 1964 (PVC 100)",
(c) the class of the pipe,
(d) the nominal size or nominal outside diameter of the pipe,
(e) the date of manufacture of the pipe and such other mark as will enable the production record of the pipe to be identified.

Where pipes are required in lengths greater than the normal lengths specified in Clause 6 the above prescribed markings shall be marked every 20 feet.

COMPLIANCE WITH SPECIFICATION

15. Any pipe found upon delivery not to have been made or marked in accordance with the foregoing requirements of this specification shall be deemed not to comply with the specification. Should sample pipes selected in accordance with Clause 17 fail to comply with the requirements of this specification the batch which the samples represent shall be deemed not to comply with this specification.

ACCESS TO FACTORY

16. The purchaser or his representative shall have access at all reasonable times to the manufacturer's premises where pipes, to his order, are manufactured or tested.

MANUFACTURER'S CERTIFICATE AND SAMPLING

17. The manufacturer shall satisfy himself by regular periodical testing that the pipes comply with the requirements of this specification and shall supply to the purchaser when requested a copy of the routine test certificate applying to the pipes supplied.

If this is not forthcoming and in the absence of an agreed scheme for sampling by purchaser and vendor, the following scheme of sampling shall be used. A batch shall consist of 125 pipes of the same diameter and class, or, of a complete consignment of such pipes if the consignment comprises fewer than 125 pipes. The purchaser if he so desires may select at random from each batch six pipes of normal length for the purpose of testing conformity with this specification.

The manufacturer at his own expense, shall provide all samples and prepare all test pieces and supply labour and appliances for the tests specified in this specification. If the manufacturer has not facilities at his own works for making the prescribed tests he shall bear the cost of carrying out the tests elsewhere.

TABLE 1: SERVICE AND DISTRIBUTION PIPES

Designation (Nominal size)	Nominal outside diameter d_e	Limits of mean outside diameter d_m		Limits of any single outside diameter d_s		Wall thickness	
		minimum $d_m=d_e$	maximum $d_m=d_e+t_m$	minimum $d_s=d_e-t_e$	maximum $d_s=d_e+t_e$	minimum S	maximum $S+t_s$
in	mm	mm	mm	mm	mm	mm	mm
½	16	16·0	16·3	15·5	16·5	1·2	1·6
⅝	20	20·0	20·3	19·5	20·5	1·5	1·9
¾	25	25·0	25·3	24·5	25·5	1·9	2·3
1	32	32·0	32·3	31·5	32·5	1·9	2·3
1¼	40	40·0	40·3	39·5	40·5	2·3	2·8
1½	50	50·0	50·3	49·4	50·6	2·9	3·4

$t_m = \cdot005\,d_e$ with a minimum value of 0·3 ⎫
$t_e = \cdot012\,d_e$ with a minimum value of 0·5 ⎬ rounded off to the nearest 0·1 mm above
$t_s = 0\cdot1S + 0\cdot2$ ⎭ the calculated value.

A circumferential stress of 100 kgf/cm² and a pressure of 16 kgf/cm² have been used as the basis for calculating the minimum wall thickness of pipes of ½″, ⅝″ and ¾″ nominal size. In the case of the 1″, 1¼″ and 1½″ sizes the pressure has been taken as 12·2 kgf/cm².

TABLE 2: WATERMAIN PIPES

Designation (Nominal size)	Nominal outside diameter d_e	Limits of mean outside diameter d_m		Limits of any single outside diameter d_s		Wall thickness Class B		Class C		Class D	
		minimum $d_m=d_e$	maximum $d_m=d_e+t_m$	minimum $d_s=d_e-t_e$	maximum $d_s=d_e+t_e$	minimum S	maximum $S+t_s$	minimum S	maximum $S+t_s$	minimum S	maximum $S+t_s$
in.	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
2	63	63·0	63·4	62·2	63·8	1·9	2·3	2·8	3·3	3·7	4·3
2½	75	75·0	75·4	74·1	75·9	2·3	2·8	3·3	3·9	4·4	5·1
3	90	90·0	90·5	88·9	91·1	2·7	3·2	4·0	4·6	5·2	5·9
4	110	110·0	110·6	108·6	111·4	3·3	3·9	4·9	5·6	6·4	7·3
4½	125	125·0	125·7	123·5	126·5	3·7	4·3	5·5	6·3	7·2	8·1
5	140	140·0	140·7	138·3	141·7	4·2	4·8	6·2	7·0	8·1	9·1
6	160	160·0	160·8	158·0	162·0	4·8	5·5	7·0	7·9	9·2	10·3
	180	180·0	180·9	177·8	182·2	5·4	6·2	7·9	8·9	10·4	11·7
	200	200·0	201·0	197·6	202·4	6·0	6·8	8·8	9·9	11·5	12·9
	225	225·0	226·2	222·3	227·7	6·7	7·6	9·9	11·1		
	250	250·0	251·3	247·0	253·0	7·4	8·4	11·1	12·3		
	280	280·0	281·4	276·6	283·4	8·3	9·4	12·3	13·8		
	315	315·0	316·6	311·2	318·8	9·4	10·6	13·8	15·4		
	355	355·0	356·8	350·7	359·3	10·6	11·9	15·6	17·4		
	400	400·0	402·0	395·2	404·8	11·9	13·3	17·5	19·5		

$t_m = 0\cdot005\,d_e$ with a minimum value of 0·3 ⎫
$t_e = 0\cdot012\,d_e$ with a minimum value of 0·5 ⎬ rounded off to the nearest 0·1 mm above
$t_s = 0\cdot1S + 0\cdot2$ ⎭ the calculated value.

A circumferential stress of 100 kgf/cm² has been used as a basis for calculating the minimum wall thickness of pipes. The pressures used are 6·1 kgf/cm², 9·15 kgf/cm² and 12·2 kgf/cm², in the cases of Class "B", "C" and "D" pipes respectively.

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